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Claims

1. A retractable cable assembly, in which a retractable cable is connected to a flexible circuit board element.

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2. The assembly of claim 1, wherein the flexible circuit board element is in the form of an elongate length of flexible circuit board.

3. The assembly of claim 1 or 2, wherein the flexible circuit board element has one or more electrical tracks provided thereon for connection with one or more wires of the retractable cable.

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4. The assembly of claim 1, 2 or 3, wherein the flexible circuit board element is in the form of a coiled strip.

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5. The assembly of any preceding claim, wherein the flexible circuit board element includes a land portion of flexible circuit board and a length of flexible circuit board extending therefrom.

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6. The assembly of claim 5, wherein the land portion is provided with connection circuitry thereon.

7. The assembly of any preceding claim, wherein the flexible circuit board element has a flexible substrate, conductive elements thereon, and an insulative cover layer.

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8. The assembly of claim 7, wherein the flexible substrate is made from one or more of polyamide, polyimide and polyester.

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9. The assembly of any preceding claim, wherein the flexible circuit board element is single-sided, double-sided or multilayered.

10. The assembly of any preceding claim, wherein the cable is of a flat configuration.

11. The assembly of any preceding claim, wherein the assembly includes a take-up reel for the retractable cable.

12. The assembly of claim 11, wherein the flexible circuit board element is mounted by the take-up reel.

13. The assembly of claim 12, wherein the flexible circuit board element is mounted within the take-up reel.

14. The assembly of claim 13, wherein the retractable cable is wound about the take-up reel and the flexible circuit board element is wound within the take-up reel.

15. The assembly of claim 14, wherein the flexible circuit board element is wound in an opposite direction to the winding of the cable.

16. The assembly of any of claims 11 to 15, wherein the take-up reel includes connection elements for connecting wires from the cable with tracks of the flexible circuit board element.

17. The assembly of any of claims 11 to 16, wherein the retractable cable is anchored towards its reel end.

18. The assembly of claim 17, wherein the retractable cable is clamped to the reel.

19. The assembly of claim 17 or 18, wherein anchoring occurs at a connection between the cable and flexible circuit board element.

20. The assembly of any of claims 11 to 19, wherein the assembly includes a mechanism for manually turning the take-up reel to retract the cable.

21. The assembly of any of claims 11 to 19, wherein the assembly includes a motor mechanism for rotating the take-up reel.

22. The assembly of claim 21, including motor activation circuitry for monitoring for a signal to activate the motor mechanism.

5 23. The assembly of claim 22, wherein the signal is from circuitry of a device with which the assembly is associated.

24. The assembly of any of claims 11 to 19, wherein the reel is spring-biased to retract the cable.

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25. The assembly of claim 24, wherein the assembly includes a coiled spring to provide the spring-bias.

15 26. The assembly of any preceding claims, including a latch mechanism to prevent retraction of the cable until the latch mechanism is released.

27. The assembly of any preceding claim, including a sensor for indicating that the cable is extended and/or retracted.

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28. The assembly of any preceding claim, wherein the assembly is adapted to be integral with a device.

25 29. The assembly of claim 28, wherein the flexible circuit board element is adapted to provide a connection between the cable and input and/or output circuitry of the device.

30. The assembly of any of claims 1 to 27, wherein the assembly is configured as a stand-alone unit.

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31. The assembly of claim 30, wherein the flexible circuit board element provides a connection between the cable and connection componentry for connecting the cable to an input and/or output connection of another device.

32. The assembly of any preceding claim, wherein the assembly includes a transducer component at the free end of the retractable cable.

5 33. An assembly according to any preceding claim, wherein a free end of the cable device includes thereon one or more of an earphone, an microphone, a headset, a loudspeaker, and/or a games controller.

34. The assembly of any of claims 1 to 31, wherein the assembly includes a connection element at the free end of the retractable cable.

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35. The assembly of any preceding claim, including two or more retractable cables.

15 36. The assembly of any preceding claim, wherein the flexible circuit board element is formed from the coiling of a straight cut length of flexible circuit board material.

20 37. The assembly of any of claims 1 to 35, wherein the flexible circuit board element is formed from a spiral strip of flexible circuit board cut from a flat sheet of flexible circuit board material, the strip being wound into a coil.

25 38. The assembly of claim 37, wherein one end of the strip includes a land portion on which electronic componentry can be mounted, and the spiral portion of the flexible circuit board element is wound about an axis angled to the plane of the land portion.

30 39. The assembly of claim 37, wherein the flexible circuit board element is formed from a flat sheet of flexible circuit board material in which a strip of flexible circuit board material spirals about a central land portion.

40. A retractable cable assembly, in which the cable is connected to associated circuitry through a flexible circuit board element.

41. A retractable cable assembly in which the cable is provided at least in part by a flexible circuit board element.

5 42. A retractable cable assembly in which the cable is an extension of a flexible circuit board element.

43. A device including a retractable cable assembly in accordance with any preceding claim.

10 44. The device of claim 43, wherein the device comprises one of a mobile phone, a portable computing device, or a personal sound device.

45. A personal electronic device including an assembly in accordance with any of claims 1 to 42.

15 46. A cable management assembly including a flexible circuit board element that connects an extendible cable with associated electronic componentry.

20 47. A cable management assembly including a retractable cable mounted on a take-up reel, and a coiled flexible circuit board element mounted within the take-up reel and electrically connected to the retractable cable so as to allow the cable to connect with associated electronic circuitry whilst also accommodating movement of the reel end of the cable when the cable is
25 retracted or extended.

48. A flexible circuit board element having a coiled portion and a land portion, with the coiled portion coiling about an axis inclined to the plane of the land portion, the coiled portion having one or more electrical tracks thereon, and
30 the land portion having one or more electronic components thereon.

49. A method of making a flexible circuit board element including the steps of cutting a spiral length of material from a sheet of flexible circuit board and coiling the spiral length.

50. The method of claim 49, wherein the flexible circuit board element includes a land portion, and the spiral of material is provided about the land portion.

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51. A method of making a retractable cable assembly or device including such an assembly, the assembly including a flexible circuit board element for connecting a cable to associated circuitry, and the method including the step of making the flexible circuit board element in accordance with the method of claim 49 or 50.

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52. A retractable cable assembly, the assembly including a reel element having a retractable cable mounted about its outside and a coiled connection element mounted within the reel element and connected with the cable.

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53. A retractable cable assembly, the assembly including a reel element that has a retractable cable mounted about its outside and a coiled connection element mounted within it, the coiled connection element connecting the retractable cable with associated circuitry.

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54. The assembly of claim 53, wherein the connection element within the reel is part of the retractable cable, the cable being anchored at or adjacent to the point where the cable enters the reel, so as to separate the cable into two portions.

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55. The assembly of claim 53 or 54, wherein the cable portion within the reel is wound in the opposite direction to the cable portion outside of the reel.

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56. A retractable cable assembly including a retractable cable, a take-up reel for mounting the cable, a motor mechanism for rotating the reel, and motor control circuitry for activating the motor to withdraw the cable on receipt of an activation signal.

57. The assembly of claim 56, including a control for determining when a predetermined action occurs in a device with which the assembly is associated and for issuing the activation signal.

- 5 58. The assembly of claim 57, wherein the predetermined action is one or more of a voice command, a power-down of the device, a change in status of the device to a status in which the cable is not required, or the activation of a switch of the device to indicate that retraction of the cable is desired.

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